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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/448,276 | 11/24/1999 | YUN BOK LEE | 8733.20024 | 4858 |

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| EXAMINER | |
|---|---|
| RUDE, TIMOTHY L | |
| ART UNIT | PAPER NUMBER |
| 2871 | |

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/448,276 | LEE ET AL. | |
| | Examiner | Art Unit | |
| | Timothy L Rude | 2871 | |

*-- The MAILING DATE of this communication app ars on the cover sh et with the c rrespondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *22 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *19* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-5, 7, 11, 14, 17-33, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (APA) in view of Yamada et al (Yamada) USPAT 6,344,883.

As to claim 1, APA discloses in Figure 1 and in the description of the related art, a multi-domain liquid crystal display device comprising: first and second substrates facing each other; a liquid crystal layer between said first and second substrates; a plurality of gate bus lines arranged in a first direction on said first substrate and a plurality of data bus lines arranged in a second direction on said first substrate to define a pixel region; a pixel electrode in said pixel region; and a common electrode on said second substrate.

APA does not explicitly disclose a dielectric frame in a region other than a region where said pixel electrode is formed, a dielectric frame distorting electric field applied to

said liquid crystal layer, and an alignment layer on at least one substrate between said first and second substrates.

Yamada discloses in Figures 10A-10D (col. 19, line 40 through col. 27, line 35) a dielectric frame, 36, (OMR83, col. 26, lines 45-62) in a region other than a region where said pixel (pixel region in 10C) electrode is formed, said dielectric frame distorting electric field applied to said liquid crystal layer (inherent to dielectric material, OMR83), and an alignment layer, 38a and 38b, on at least one substrate between said first and second substrates.

Yamada is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a dielectric frame to the LCD of APA to avoid a rough display in gray scales (col. 13, lines 36-46).

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA with the Dielectric frame of Yamada.

As to claim 2, APA discloses in Figure 1 a gate insulator over said whole first substrate (not shown); a passivation layer, 37, on said gate insulator over said whole first substrate; and a light shielding layer, 25, on said second substrate, and a color filter layer, 23, on said light shielding layer.

APA does not explicitly disclose an over coat layer on said color filter layer.

Yamada discloses (col. 32, lines 22-60) a color filter layer and an over coat layer, 90a, on said color filter layer.

Yamada is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an over coat layer on said color filter layer to provide a color display with good control of LC alignment.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA with the over coat layer of Yamada.

As to claim 3, Yamada discloses (col. 26, lines 45-62) a dielectric frame made from resist material OMR83 wherein said dielectric frame is therefore patterned.

As to claim 4, Yamada discloses in Figures 12A and 12B (col. 25, lines 25-39) a dielectric frame that maintains uniformly gap between said first and second substrates by supporting the spacers, 65.

As to claim 5, Yamada discloses (col. 26, lines 45-62) a dielectric frame made from resist material OMR83 wherein the dielectric constant of said dielectric frame is therefore different than that of said liquid crystal layer.

As to claim 7, Yamada discloses (col. 26, lines 45-62) a dielectric frame including photosensitive materials (OMR83).

As to claims 11 and 14, Yamada discloses in Figures 10A-10D (col. 19, line 40 through col. 27, line 35) the multi-domain liquid crystal display device according to claim 1, wherein said pixel electrode (col. 20, lines 5-9) has an electric field inducing window, 35, inside of itself.

As to claim 17, Yamada discloses the use of polyimide-type materials for the homeotropic alignment layer (Applicant's passivation layer).

As to claim 18, APA in view of Yamada does not explicitly disclose a passivation layer of a material selected from the group consisting of silicon nitride and silicon oxide. However, the use of these materials for a passivation layer is well known in the art of liquid crystals and is therefore and obvious expedient.

As to claims 19 and 20, Yamada discloses the use of pixel and common electrodes made of ITO (col. 25, lines 25-32).

As to claim 21, Yamada discloses in Figures 10A-10D (col. 19, line 40 through col. 27, line 35) the multi-domain liquid crystal display device according to claim 1, wherein said pixel region is divided into at least two portions (Figure 10D), liquid crystal molecules in said liquid crystal layer in each portion being driven differently from each other.

As to claim 22, Yamada discloses in Figure 10B and as prior art in Figure 30B a multi-domain liquid crystal display device wherein the alignment layer is divided into at least two portions, liquid crystal molecules in said liquid crystal layer in each portion being aligned differently from each other.

As to claim 23, Yamada discloses as prior art (col. 2, lines 63-67) a multi-domain liquid crystal display device wherein at least one portion of said alignment layer is alignment-treated.

As to claim 24, Yamada discloses as prior art (col. 2, lines 53-57) a multi-domain liquid crystal display device wherein all portions of said alignment layer are non-alignment-treated.

As to claim 25, Yamada discloses as prior art the use of a liquid crystal layer including liquid crystal molecules having positive dielectric anisotropy (col. 2, lines 22-47).

As to claim 26, Yamada discloses (col. 6, lines 56-64) the multi-domain liquid crystal display device according to claim 1, wherein said liquid crystal layer includes liquid crystal molecules having negative dielectric anisotropy.

As to claim 27, Yamada discloses (col. 17, lines 47-50) a negative uniaxial film on at least one substrate.

As to claim 28, Yamada discloses (col. 17, lines 50-58) a negative biaxial film on at least one substrate.

As to claim 29, Yamada discloses (col. 26, line 65 through col. 27, line 7) the use of a liquid crystal layer including chiral dopants.

As to claim 30, APA discloses in Figure 1 and in the description of the related art, a multi-domain liquid crystal display device comprising: first and second substrates facing each other; a liquid crystal layer between said first and second substrates; a plurality of gate bus lines arranged in a first direction on said first substrate and a plurality of data bus lines arranged in a second direction on said first substrate to define a pixel region; a pixel electrode in said pixel region; and a common electrode on said second substrate.

APA does not explicitly disclose a dielectric frame surrounding said pixel region, said dielectric frame distorting electric field applied to said liquid crystal layer; and an alignment layer on at least one substrate between said first and second substrates.

Yamada discloses in Figures 10A-10D (col. 19, line 40 through col. 27, line 35) a dielectric frame, 36, (OMR83, col. 26, lines 45-62) surrounding said pixel region (Figure 10C), said dielectric frame distorting electric field applied to said liquid crystal layer; and

an alignment layer, 38a and 38b, on at least one substrate between said first and second substrates.

Yamada is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a dielectric frame to the LCD of APA to avoid a rough display in gray scales (col. 13, lines 36-46).

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA with the Dielectric frame of Yamada.

As to claim 31, APA discloses in Figure 1 a gate insulator over said whole first substrate (not shown); a passivation layer, 37, on said gate insulator over said whole first substrate; and a light shielding layer, 25, on said second substrate, and a color filter layer, 23, on said light shielding layer.

APA does not explicitly disclose an over coat layer on said color filter layer.

Yamada discloses (col. 32, lines 22-60) a color filter layer and an over coat layer, 90a, on said color filter layer.

Yamada is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add an over coat layer on said color filter layer to provide a color display with good control of LC alignment.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA with the over coat layer of Yamada.

As to claim 32, Yamada discloses (col. 26, lines 45-62) a dielectric frame made from resist material OMR83 wherein said dielectric frame is therefore patterned.

As to claim 33, Yamada discloses (col. 26, lines 45-62) a dielectric frame made from resist material OMR83 wherein the dielectric constant of said dielectric frame is therefore different than that of said liquid crystal layer.

As to claim 35, Yamada discloses (col. 26, lines 45-62) a dielectric frame including photosensitive materials (OMR83).

2. Claims 6, 8-10, 34, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (APA) in view of Yamada, and further in view of Horie et al (Horie) USPAT 6,061,117.

As to claim 6 and 34, APA in view of Yamada does not explicitly disclose the multi-domain liquid crystal display device according to claims 1 and 30 respectively, wherein said dielectric frame shields light leakage from a region other than said pixel region.

Horie teaches (col. 7, lines 4-15) the use of a black dye in the dielectric frame to provide light shielding.

Horie is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a black dye to provide a light shielding property to the dielectric frames.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Yamada with the light shielding frames of Horie.

As to claim 8 and 36, APA in view of Yamada does not explicitly disclose the multi-domain liquid crystal display device according to claims 1 and 30 respectively, wherein said dielectric frame includes a material selected from the group consisting of BCB (BenzoCycloButene) and photoacrylate.

Horie teaches (col. 18, lines 5-32) the use of photocurable resins including acrylic acid and acrylates having a long-chain alkyl group with three or more carbon atoms or having a benzene ring.

Horie is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to use photoacrylate to facilitate easy fabrication of the frame.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Yamada with the photoacrylate of Horie.

As to claims 9 and 37, APA in view of Yamada does not explicitly disclose the multi-domain liquid crystal display device according to claims 1 and 30 respectively, wherein said dielectric frame includes mixture of polyimide and carbon black.

Horie teaches (col. 15, lines 38-50) the use of polyimide for the frame (convex portion) and Horie teaches the use of a black dye (col. 7, lines 4-15).

Horie does not explicitly disclose the use of carbon black as the dye. However, the use of carbon black as a dye for light shields is well known in the art of liquid crystals.

Horie is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a black dye of carbon black to provide a light shielding property to the dielectric frames.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Yamada with the carbon black dyed light shielding frames of Horie.

As to claims 10 and 38, Yamada discloses the use of acrylic resin (acrylic negative resist, col. 35, lines 2-10) for the dielectric frame. Horie discloses the use of a black dye in the frame for light shielding (col. 7, lines 4-15).

APA in view of Yamada does not explicitly disclose the use of carbon black as the dye. However, the use of carbon black as a dye for light shields is well known in the art of liquid crystals.

Horie is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a black dye of carbon black to provide a light shielding property to the dielectric frames.

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the acrylic LCD frames of APA in view of Yamada with the carbon black dye of Horie.

3. Claims 12, 13, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's admitted prior art (APA) in view of Yamada, as applied above, and further in view of Murai et al (Murai) USPAT 5,963,290.

As to claims 12, 13, 15, and 16, APA in view of Yamada discloses the device as claimed except wherein said passivation layer has an electric field inducing window inside of itself, wherein said gate insulator has an electric field inducing window inside of itself, wherein said color filter layer has an electric field inducing window inside of itself, and/or, wherein said over coat layer has an electric field inducing window inside of itself.

Murai teaches in Figure 2 that the use of an aperture (Applicant's field inducing window) is known in the art to be suitable for the intended purpose of causing the liquid crystal molecules to tilt in different directions thereby improving the viewing characteristics (col. 3, lines 1-33).

Murai is evidence that ordinary workers in the art of liquid crystals would find the reason, suggestion, or motivation to add a passivation layer with an electric field inducing window inside of itself, said gate insulator with an electric field inducing window inside of itself, said color filter layer with an electric field inducing window inside of itself, and/or, said over coat layer with an electric field inducing window inside of itself as a structure having art-recognized suitability for the intended purpose of causing the liquid crystal molecules to tilt in different directions thereby improving the viewing characteristics (MPEP 2144.07).

Therefore, it would have been obvious to one having ordinary skill in the art of liquid crystals at the time the invention was made to modify the LCD of APA in view of Yamada with the passivation layer with an electric field inducing window inside of itself, said gate insulator with an electric field inducing window inside of itself, said color filter layer with an electric field inducing window inside of itself, and/or, said over coat layer with an electric field inducing window inside of itself of Yamada as a structure having art-recognized suitability for the intended purpose of causing the liquid crystal molecules to tilt in different directions thereby improving the viewing characteristics.

***Response to Arguments***

4. Applicant's arguments filed 05 June 2002 have been fully considered but they are not persuasive.

Applicant's ONLY arguments are as follows:

(1) None of the cited references teach a dielectric frame in a region other than a region where said pixel electrode is formed.

(2) Yamada Figs 10A-10D show the convex portion, 36, is on the pixel electrode (rather than in a region other than a region where the pixel electrode is formed).

(3) None of the cited references teach a dielectric frame surrounding a pixel region that is defined by the gate bus line and the data bus line.

Examiner's responses to Applicant's ONLY arguments are as follows:

(1) and (2) It is respectfully pointed out that the illustrations of Yamada are unfortunately poor with respect to electrode details. However, it is clear from the text of Yamada that the frames (convex portions, 36) surround the pixel area. Please consider embodiment 1 upon which the subsequent embodiments in part rely (col. 13, lines 25-27 and lines 36-46). Also, please note that it is well known in the art that pixel electrodes simply must be electrically isolated from neighboring pixel electrodes, most commonly by a gap, despite the illustrations of Yamada. Further, the gate bus lines and

data bus lines conventionally run along said gap as is indicated by Applicant's admitted prior art (APA).

(3) It is respectfully pointed out that APA discloses a pixel region that is defined by the gate bus line and the data bus line and Yamada teaches (with motivation to combine) a frame, 36, that surrounds the

pixel region per rejections above.

## *Conclusion*

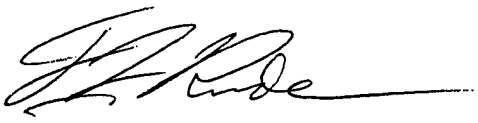
**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy L Rude whose telephone number is (703) 305-0418. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.



TLR
October 9, 2003

Timothy L Rude
Examiner
Art Unit 2871